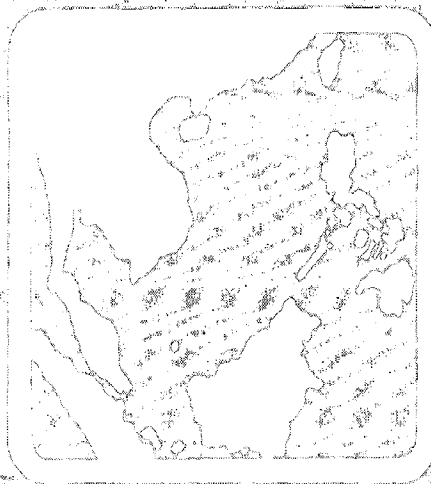


Shipping, Energy, and Environment: Southeast Asian Perspectives for the 1980s



Workshop Report*

by

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August 1981



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presented and discussions at a Workshop at the East-West Center, Honolulu, Hawaii,
1980, organized and co-sponsored by the Environment and Policy Institute of the East-
and the Dalhousie Ocean Studies Programme of the Dalhousie University, Halifax,
Canada.

THE EAST-WEST CENTER—officially known as the Center for Cultural and Technical Interchange Between East and West—is a national educational institution established in Hawaii by the U.S. Congress in 1960 to promote better relations and understanding between the United States and the nations of Asia and the Pacific through cooperative study, training, and research. The Center is administered by a public, nonprofit corporation whose international Board of Governors consists of distinguished scholars, business leaders, and public servants.

Each year more than 1,500 men and women from many nations and cultures participate in Center programs that seek cooperative solutions to problems of mutual consequence to East and West. Working with the Center's multidisciplinary and multicultural staff, participants include visiting scholars and researchers; leaders and professionals from the academic, government, and business communities; and graduate degree students, most of whom are enrolled at the University of Hawaii. For each Center participant from the United States, two participants are sought from the Asian and Pacific area.

Center programs are conducted by institutes addressing problems of communication, culture learning, environment and policy, population, and resource systems. A limited number of "open" grants are available to degree scholars and research fellows whose academic interests are not encompassed by institute programs.

The U.S. Congress provides basic funding for Center programs and a variety of awards to participants. Because of the cooperative nature of Center programs, financial support and cost-sharing are also provided by Asian and Pacific governments, regional agencies, private enterprise and foundations. The Center is on land adjacent to and provided by the University of Hawaii.

THE EAST-WEST ENVIRONMENT AND POLICY INSTITUTE was established in October 1977 to increase understanding of the interrelationships among policies designed to meet a broad range of human and societal needs over time and the natural systems and resources on which these policies depend or impact. Through interdisciplinary and multinational programs of research, study, and training, the Institute seeks to develop and apply concepts and approaches useful in identifying alternatives available to decision makers and in assessing the implications of such choices. Progress and results of Institute programs are disseminated in the East-West Center region through research reports, books, workshop reports, working papers, newsletters, and other educational and informational materials.

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FOREWORD

The Environment and Policy Institute (EAPI) of the East-West Center was established in October 1977 to conduct research and education programs through multinational collaboration on environmental aspects of policy and decision-making in the East-West region. The program of the Institute emphasizes (1) analysis of various dependence and impacts on natural systems and thus on the objectives of the policies, and (2) assessment of scientific and technical information about natural systems for more coherent policy formulation and implementation through planning and management. This systematic approach avoids the polarization of environmental values versus sectoral goals.

The marine environment represents a major resource for the countries of the world as they strive to meet a variety of needs on a sustained basis. Concerns such as environmental quality, viability of fish stocks, and orderly exploitation of hydrocarbons are important priorities as countries consider individual and collective strategies for effective utilization of the oceans. EAPI, with the cooperation of other Center Institutes, has undertaken a Project on Marine Environment and Extended Maritime Jurisdictions to study critical transnational resource and environment issues in Southeast Asian seas. A brief description of this Project appears in Appendix 1.

In the early stages of this Project, it was determined that the shipment of various energy mate-

rials could have significant implications for international relations and for environmental quality and the productivity of aquatic resources. In early 1980, EAPI and the Dalhousie Ocean Studies Programme (DOSP) of Dalhousie University decided to organize and co-sponsor a regional Workshop on this key topic.

In December 1980, the Workshop in Honolulu, Hawaii, was attended by more than 30 leading authorities and experts from governmental and intergovernmental organizations, private companies, and academic institutions in nine countries. Persons attended and participated in the Workshop in their individual capacities and did not represent or speak for their organizations or countries. This report of the Workshop's findings, conclusions, and recommendations presents the spectrum of views expressed at the meeting. It should not be assumed that every participant subscribes to every statement, although a broad consensus was reached on most major points.

This report is the first step in communicating some of the results of this Workshop. In future publications and in follow-up meetings, we anticipate that the work begun will continue and reach a wider audience. In this way, we hope we are contributing to a creative resolution of issues that are vital to national and international interests of countries in the region.

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ACKNOWLEDGMENTS

Edgar Gold of DOSP and the author were responsible for the planning and organization of the Workshop; Douglas Johnston and Arthur Hanson, DOSP, and Yoshiaki Matsuda, EAPI, assisted in this process, and Yoshiaki Matsuda was responsible for the initial implementation of the organizational plan. The success of the Workshop was due in part to the excellent support services of Rochelle McArthur, Program Officer, Fannie Lee Kai, Administrative Assistant, and Wanda McFall, Project Secretary, EAPI. This Report was improved by the critical review of the DOSP group; Norman Letalik coordinated this review and he and Arthur Hanson wrote the first draft of the Conclusions. Wanda McFall typed the drafts and Sherry Bryson, Publications Officer, and Helen Takeuchi, Publications Assistant, EAPI, prepared the manuscript for publication.

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Shipping, Energy, and Environment: Southeast Asian Perspectives for the 1980s

INTRODUCTION

Changing national perceptions of the ocean are resulting in the unilateral extension of national jurisdictions to 200 nautical miles from shore. Nevertheless, many marine resources are transnational in distribution; the ocean, a continuous fluid system, transmits environmental pollutants and their impacts; and maritime activities such as shipping will necessarily transcend the new national marine jurisdictional boundaries. Management policies for these national zones of extended jurisdiction may be developed and implemented separately with insufficient scientific and technical understanding of the transnational character of the ocean environment and the activities that it supports. Such policies may thus produce an increase in international tensions, misunderstandings, and conflicts concerning marine activities, resources, and environmental quality.

In particular, uncoordinated environmental policies for extended jurisdictional zones may influence transportation routes of energy sources or byproducts—eg, oil, liquefied natural gas (LNG), uranium ore, nuclear spent fuel, and, eventually, hydrogen. Altered routing of energy materials may have an impact on energy policies themselves. Also, energy needs and policies will determine energy material transport needs and policies and thus influence environmental policies regarding transport of energy material in extended jurisdictional zones. There is thus developing the prospect of a dynamic interaction between national energy policies and marine environmental policies with energy transportation requirements, routes, and standards as the link.

The South China Sea region is a nexus for energy material transportation between the Middle East and East Asia and the United States. More

than 90 percent of Japan's oil imports move through this region, as does most of the oil supply for the Republic of Korea; one of four alternative routes used by tankers carrying oil from the Middle East to the United States East Coast passes through the region. Moreover, all the nations and entities in the region import oil; Indonesia, Brunei, and Malaysia also export significant quantities to regional and extraregional destinations, and China and Vietnam may also become exporters in the 1980s. Some nuclear spent fuel being moved from Japan to Europe may pass through the region; such shipments may increase as more nations employ nuclear energy. Uranium ore may soon move through the region from Australia to Japan.

The implementation of the Safe Navigation Scheme in the Malacca Straits, including a minimum underkeel clearance of 3.5 meters, may force some Ultra Large Crude Carriers (ULCCs) to alter their routes through the region. The archipelagic nations such as Indonesia and the Philippines must designate sealanes for transit passage through their waters and may consider environmental factors in such designations. Finally, various coastal nations are developing environmental regulations for their newly claimed waters that may affect tanker operations.

Thus, the Project Marine Environment and Extended Maritime Jurisdictions of the Environment and Policy Institute and the Dalhousie Ocean Studies Programme thought the timing appropriate for consideration of implications of policy alternatives concerned with potential conflicts between environmental policies and energy policies in the South China Sea. This multinational, multidisciplinary Workshop on the subject was designed to provide an informal forum

for the exchange of views on the relevant issues and policy options for the 1980s.

Approximately 35 authorities and experts drawn from governmental organizations, indus-

try, and academic institutions participated in this Workshop. Sessions included delivered papers, comment, and general discussion.

WORKSHOP RECOMMENDATIONS

These recommendations were extracted from the Workshop papers and discussions and present the spectrum of views expressed at the meeting. It should not be assumed that every participant subscribes to every recommendation, although a broad consensus was reached on most major points.

Workshop participants recommended that when appropriate, coastal states in Southeast Asia should individually and collectively:

1. Create institutions to carry out the duties placed on port and coastal states by the draft Caracas Convention on the Law of the Sea.

2. Designate and establish sealanes, develop and maintain traffic separation schemes, vessel traffic management systems, navigational aids, and coastal facilities for oil storage, and study the possibility of establishing sites where damaged, leaking tankers may be taken for repair (tanker "hospitals") and routes to reach them.

3. Ratify/accede to important existing international marine pollution conventions (Table 1), ie:

- a. (draft) Caracas Convention on the Law of the Sea (when appropriate);

- b. International Convention for the Prevention of Pollution from Ships, 1973; and Protocol of 1978 (MARPOL 1973 and its 1978 Protocol);

- c. International Convention on Prevention of Pollution of the Sea by Oil, 1954 and Amendments of 1962, 1969, and 1971 (1954 OILPOL and its 1962, 1969, and 1971 Amendments);

- d. International Convention on Civil Liability for Oil Pollution Damage, 1969, and Protocol of 1976 (1969 Civil Liability Convention and its 1976 Protocol);

- e. International Convention on the Establishment of an International Fund for Oil Pollution Damage, 1971, and Protocol of 1976 (1971 Fund Convention and its 1976 Protocol);

- f. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, and 1978 Amendments on Procedure for the Settlement of Disputes and on the Prevention and Control of Pollution by Incineration of Wastes and Other Matter (1972 London Dumping Convention and its 1978 Amendments);

- g. International Convention on Civil Liability for Oil Pollution Damage Resulting from the Exploration and Exploitation of Submarine Resources, 1977 (CL for Explore and Exploit 1977);

- h. Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS 1972); and

- i. International Convention on Standards of Training, 1978 (STWC 1978);

- and adopt the United Nations Environment Programme (UNEP) Action Plan for the East Asian Seas.

4. Develop contingency plans for spills of all types and magnitudes, particularly transnational spills, and create institutions that could coordinate national responses on a regional basis, including a regional strict liability compensation system similar to the North Sea Voluntary Compensation Scheme (OPOL), or, alternatively, a "no fault" compensation system.

5. Undertake environmental baseline surveys and attempt to place values on environmental resources.

Table 1. Important Global Treaties Dealing with Ship-Generated Marine Pollution and the Marine Environment

Convention	Description
Draft Caracas Convention	Stipulates obligation of States to protect and preserve the marine environment. Also, various articles elaborating provisions for global and regional cooperation, technical assistance, monitoring and environmental assessment, international rules, and national legislation to prevent, reduce, and control pollution of the marine environment, enforcement, safeguards, and responsibility and liability.
1954 OILPOL and its 1962, 1969, 1971 Amendments	Provides for prevention of pollution of the sea by oil; will be replaced by MARPOL 1973.
MARPOL 1973 and its 1978 Protocol	Comprehensive attempt to control operational discharge from shipping; establishes operational discharge standards for all substances except radioactive materials and requires certain equipment to achieve them, eg, segregated ballast, and record keeping and enforcement.
1969 Civil Liability Convention and its 1976 Protocol	Provides for liability of a ship owner for all pollution damage caused in the territory or in the territorial waters of another contracting state by oil which has escaped or has been discharged from his ship.
1971 Fund Convention and its 1976 Protocol	Provides for compensation for damages not compensated by Civil Liability Convention.
1972 London Dumping Convention and its 1978 Amendments	Prohibits discharge of oil within certain zones from ships over a certain size and completely for ships over 20,000 dead weight tons (DWT), and calls for waste reception facilities in ports and the installation of equipment to prevent operational pollution.
CL for Explore and Exploit 1977	Provides for civil liability for oil pollution damage resulting from the exploration and exploitation of submarine resources.
COLREGS 1972	Sets up a system for the establishment of obligatory traffic separation schemes and revises rules for safe navigation practices and navigational signals.
STWC 1978	Establishes standards of training.

6. Develop mechanisms to encourage the research necessary for the designation of *special environmental areas* as provided for in the draft Caracas Convention, possibly on a regional basis. Undertake risk analyses of special areas, and prohibit especially hazardous cargos from vulnerable and/or high risk areas.

7. Explore the possibility of establishing a regional simulator similar to that at Cardiff, Bremen, or New York for the training of tanker captains and crews.

SUMMARY OF PRESENTATIONS AND DISCUSSIONS

The Workshop was divided into five substantive sessions for presentation of contributed papers and one summary session. The subjects of these sessions, together with the contributed papers and their authors, are listed below; the content of the sessions is then summarized. The contributed papers will be published in a separate Proceedings of the Workshop by the Dalhousie Ocean Studies Programme.

List of Contributed Papers

Energy and Shipping Patterns in Southeast Asia

Energy Supply and Demand: Present Trends and Projections—K. R. Smith

Shipping Supply and Demand: Present Trends and Projections—A. D. Couper
The Future of the Supertanker*—
D. T. Isaak

Technological Development and Commercial Practice

Shipbuilding and Energy Materials: Trends of Research, Design and Development—
K. R. Chapman

Marine Carriage of Petroleum in Southeast Asia: A Preliminary Survey—
Chia Lin Sien

The Marine Carriage of Energy Materials: Environmental Implications for Southeast Asia
Navigational Hazards of Southeast Asian Waters*—J. Morgan

The Potential Impact of Pollution on the Indonesian Coastal Resources, with Special Reference to the Major Energy Shipping Routes—A. Soegiarto

Environmentally Vulnerable Resources in the Coastal Waters of Malaysia in Relation to Energy Material Shipping Routes—A. A. Jothy

Coastal Resources Development and Management: the Philippine Experience—
R. Umali

International Legal and Political Developments

UNCLOS III: Navigational Issues in
Southeast Asia—Hasjim Djalal

UNCLOS III: Environmental issues in
Southeast Asia—D. Johnston

UNCTAD: Southeast Asia and the Future of
Shipping Policy—J. G. Day

Regulatory Developments in Southeast Asia:

Preventive and Remedial Approaches

Emerging Legislative Trends in Southeast
Asia—D. Johnston and N. Letalik

Traffic Control Systems: Selection from
Maritime Traffic Rules in Japan—
S. Kaneko

Compensation for Ship-Source Marine Pollution: A Hypothetical Case Study—
E. Gold

A Regional Remedial Approach to Offshore-Sourced Oil Pollution Damage: The North Sea Voluntary Compensation Scheme (OPOL)—W. Onorato

Energy and Shipping Patterns in Southeast Asia

On a global basis, the energy industry will become more decentralized as petroleum resource-rich nations actively enter the industry. The developed world can do with less energy and still increase Gross Domestic Product (GDP), but there is some question as to whether the same applies to the developing world. Oil will be the most important energy fuel to the end of the century. Liquefied natural gas will come on stream in the 1980s and increase in importance in trade in and through the region. Nuclear fuels from Australia and spent and reprocessed fuel shipments to and from East Asia will also increase. New types of fuels (with higher toxicities) such as coal-oil mixtures, methanol, ammonia, and ethylene will become significant in international fuel trade.

There are myriad factors affecting and that may affect the pattern of energy material shipping in Southeast Asia. Some of these factors are related, some are not—all are wrought with un-

*Background papers

certainty. For example, there are supply uncertainties due to the unpredictability of new resource discoveries within (eg, offshore Vietnam and China) or outside (eg, Siberia) the region. Demand uncertainties are even greater as countries plan different energy-mix strategies and react to the effects of energy strategies of other nations. For nuclear spent fuel, the development of a safe disposal mechanism is a key, yet uncertain, factor.

The supply of tankers has been much greater than the demand since 1974 (Figure 1a), due to a decline in tanker orders and deliveries. This surplus has led to an increase in scrappings, lay-ups, slow-steaming, use of tankers as storage and facilities, and multiporting practice. A trend toward increased indigenous refining capacity in producing countries has resulted in increased export of refined products and a larger demand for product carriers. Substitute routes (eg, a deeper Suez Canal), pipelines, MARPOL 1973 and its 1978 Protocol, indigenous fleet development, and cargo-sharing will all affect the tanker market.

When the Suez Canal becomes capable of handling 53-foot draughts by the end of 1981, and later, 67-foot draughts, there probably will be a fall in demand for Very Large Crude Carriers (VLCCs) and an increase in demand for medium-size tankers (Figure 1b). One effect of the expense of MARPOL requirements such as Segregated Ballast Tanks (SBT), Clean Ballast Tanks (CBT), or Crude Oil Washing (COW) may be the accelerated scrapping of older crude and product carriers in the 40,000 + DWT class and the lengthening of the operational life of 20,000 to 40,000 DWT crude carriers and 30,000 to 40,000 DWT product carriers. Overall, there seems to be no reason to expect an increase in the demand for VLCCs in the near future. This may not apply, however, to ships below 150,000 DWT, especially crude and product carriers built to average freight rate assessment maximum (AFRAMAX) size.

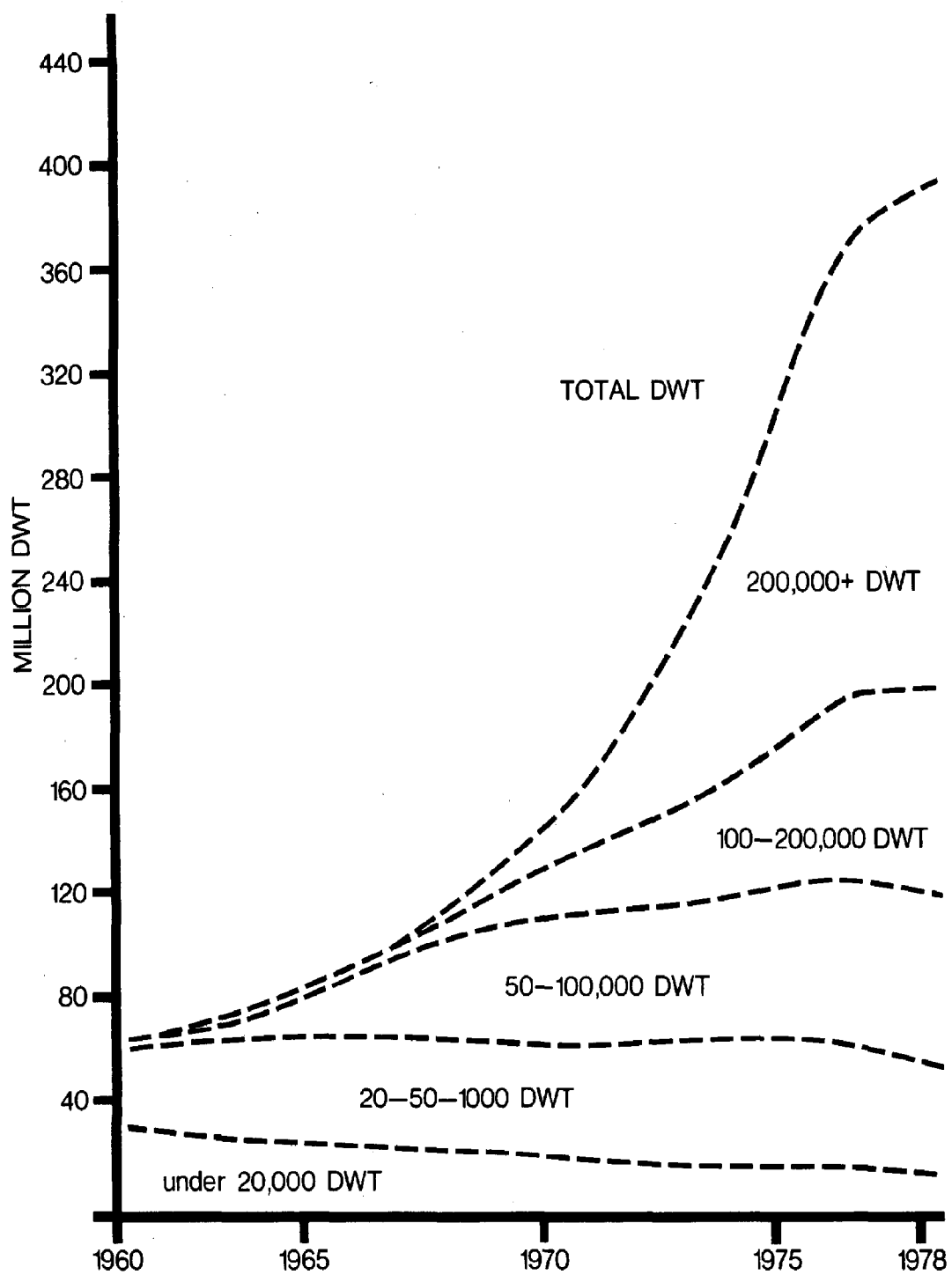
A decrease in the number of VLCCs may have implications for the marine environment. Will an increase in the number of carriers of refined products and chemicals mean smaller but more toxic pollution incidents, or will the provisions of

MARPOL and Convention on Tanker Safety and Prevention of Pollution, 1978 (TSPP Convention), be adequate to protect the environment? Because the greater environmental damage stems from operational pollution, the reduction of the supertanker portion of the fleet and the trend toward smaller, more frequent shipments may prove a mixed blessing from an environmental perspective. As oil transport becomes more decentralized with the decrease of the role of oil companies and the growth of small national fleets, regulation for environmental and safety purposes may become more difficult. Navigation in Southeast Asian waters is difficult and dangerous due to shallow water and reefs, poor visibility in storms, inaccurate hydrographic surveys, strong tidal currents, oil platforms, and, in some cases, hostile claimants to various waters. All of these problems must be addressed in the years ahead.

Technological Development and Commercial Practice

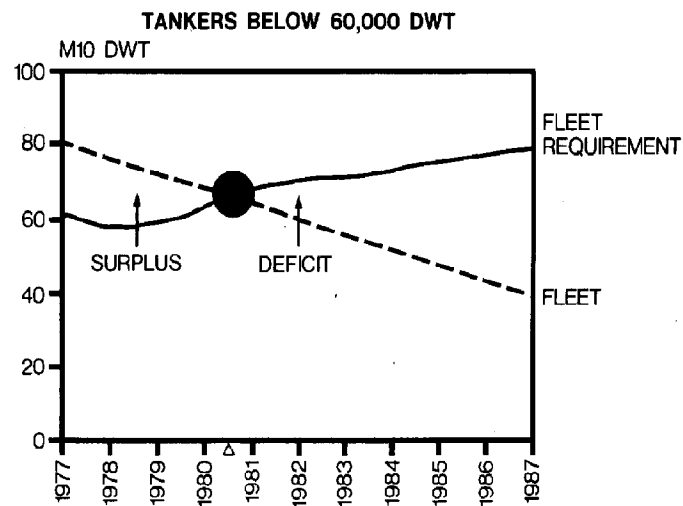
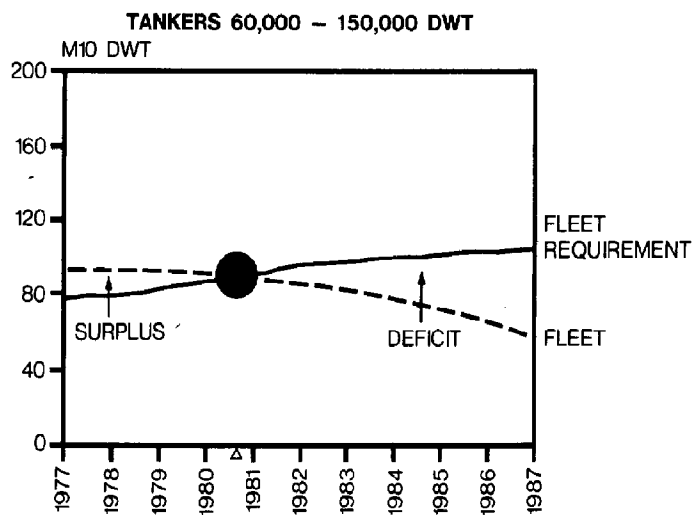
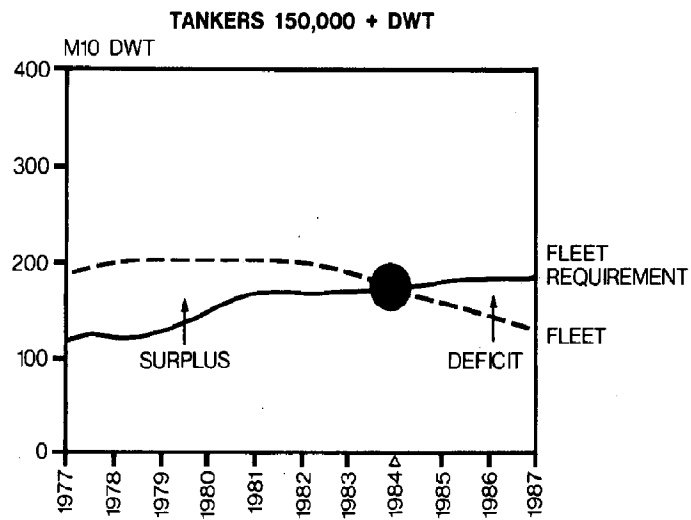
A ship on the open sea is only one piece of an integrated system of coastal and onshore facilities; consequently, a ship's design is constrained by its fit with the other components of the system. Most pollution is intentional operational pollution (eg, tank cleaning prior to taking on new shipments) rather than accidental. A few operators may have given the whole industry a bad reputation, thus Conventions to prevent pollution from ships should not be overreactive. Moreover, such Conventions should show some sympathy for cost-effectiveness. Although it is unclear whether maritime research and development has been evolutionary and regulations revolutionary, or vice versa, direct economic costs of regulations are high and the benefits uncertain.

With more countries entering the industry, however, a lowering of standards may be inevitable due to limited numbers of available trained crew and qualified personnel in classification societies. Also, new designs and purpose-built carriers are being developed with some safety related design uncertainties. There is a clear difference between commercial practice and political ideal. International legislation must be



Sources: DeGolyer and MacNaughton,
20TH CENTURY PETROLEUM STATISTICS
Lloyd's STATISTICS OF SHIPPING

Figure 1a. World tanker capacity by tonnage class, 1960-1978.



Source: Based on B & W Diesels Copenhagen

Figure 1b. Fleet requirements to 1987 v. fleet capacity for tankers below 60,000 DWT, 60,000-150,000 DWT, and more than 150,000 DWT.

Table 2. Sample Frequencies of Tanker Movements in Southeast Asia.

Destination (Route)	Hypothetical Vessel Size	Frequency
South Korea and Japan	200,000 DWT	984/yr (1/0.4 days)
Japan (Lombok-Makassar-Sulawesi Sea—east or west of the Philippines)	VLCCs	140/yr (1/2.6 days)
Sulawesi Sea	VLCCs + Tankships	25-30/yr (1/13.5 days)
Port Dickson, Malaysia	90,000 DWT	40/yr (1/9 days)
Singapore	VLCC	91/yr (1/4 days)
(Singapore Straits)	Various	15,356/yr (1178/28 days) (1/.03 days or 43 min)

uniformly enforced or complied with if it is to be of any practical value. Nevertheless, political considerations will probably override commercial and technical considerations.

Just as there are myriad factors affecting ship demand and supply, numerous factors affect routings and frequencies of movements of cargo types and carrier sizes along those routes. The oil industry by necessity is dynamic, and this dynamism is manifested in the pattern of shipping. To a degree, fleet development can occur ahead of the development of shore facilities. In general, the pattern of tanker movements is determined by the geographical distribution of oil sources and oil need.

The route of a particular tanker voyage may be determined by:

1. the location of the receiving port in relation to the source;
2. the location of fixed navigational hazards and prevailing weather and sea conditions, including tides and currents;
3. consideration of internationally or nationally prescribed sealanes and/or traffic separation schemes; and
4. the least time required, considering the above factors and pilot idiosyncracies.

The size of tankers employed will depend on the pattern of requirements of the consumer and also critically on the availability of storage capacity to receive the cargo at the terminal, and the depth of water in the approach to, and along the quay at the receiving port. This latter consideration is obviated if Single Buoy Moorings (SBMs) or VLCC storage is employed offshore. Some preliminary particulars of tanker movements with, on, and through the region are given in Table 2 and Figure 2.

Maritime shipping of oil is clearly important to the archipelagic nations, and the region is also heavily used as a through route. Possible future developments affecting tanker movements within and through the region include:

1. changes in sources of crude oil produced by, and imported to, countries in Southeast and East Asia;
2. increasing trade of crude within Association of Southeast Asian Nations (ASEAN) and an increase in third party processing arrangements until indigenous refining capacity is matched to production;
3. shortfalls of crude oil supplies to international oil companies as a result of reduction in preference crudes available;

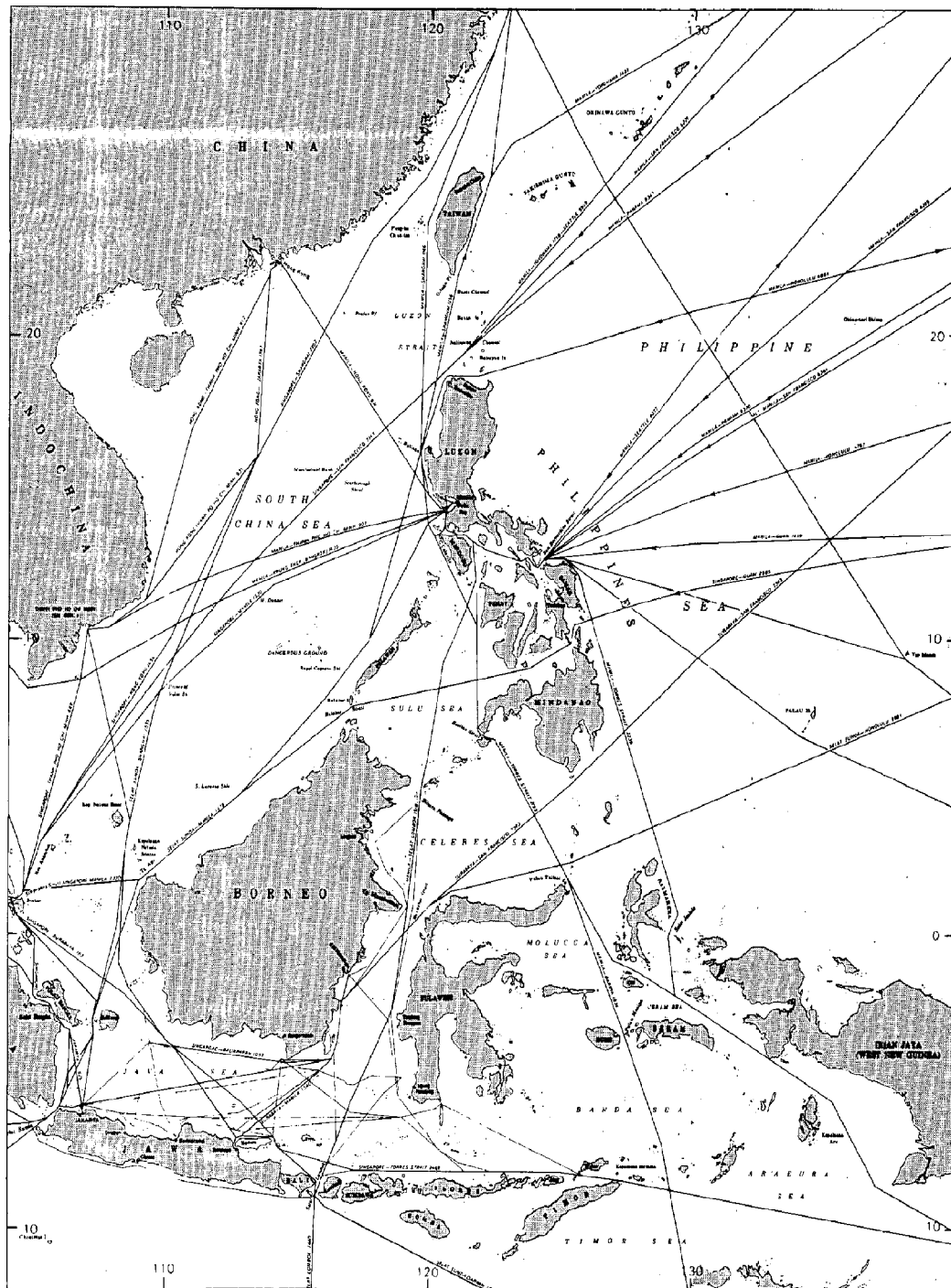


Figure 2. Maritime routes to, from, and within Southeast Asia.

4. variations in product mix required by present and potential consumers, the design and expansion of refinery capacity, and the different quality of crudes needed to meet
- shifting specific demand;
5. the development of alternative sources of energy;
6. implementation of new searoutes or traffic

- separation/safety schemes and adaptations of tanker sizes to them; and
7. new ports and expansion and upgrading of existing port facilities, including storage.

Safety depends on users as well as coastal states, and the tanker owners, exporters, importers and coastal states whose waters are used for transport should cooperate in development and implementation of specific measures.

The Marine Carriage of Energy Materials: Environmental Implications for Southeast Asia

Indonesia, Malaysia, and the Philippines are three water-separated countries with valuable and vulnerable marine and coastal environmental resources distributed along major energy-material shipping routes.

Archipelagic *Indonesia* has one of the world's longest coastlines (81,000 km), and the sea comprises two-thirds of the area under Indonesian jurisdiction (Figure 3). The way in which this area is used will affect Indonesia's ability to meet increasing demands for food and raw materials, her position and influence in the regional community of nations, her national resilience and economy, and the environmental quality of the country as a whole. Indonesia exports and imports crude oil, and refined products are transported domestically. In addition, more than 90 percent of the crude supply for Japan is shipped from the Middle East and Africa through Indonesian waters in the Malacca Strait and elsewhere; accidents and spills have occurred.

Monitoring of marine hydrocarbon and beach tarball concentrations and observations of oil slicks have been initiated. Much more work remains to be done, including studies of the impact of oil on biological communities in the tropical aquatic environment. Concern about biological damage from oil is focused on spawning grounds of milkfish and penaeid shrimps; and severe but possibly localized damage may occur to brackish water ponds, coral reefs and mangrove ecosystems, and marine parks and tourist destinations.

In an institutional response to these problems, the coordination of efforts to mitigate marine pol-

lution is the responsibility of the Office of the State Minister for Development Supervision and Environment. A Standard Operating Procedure for oil spills in the Malacca-Singapore Straits is coordinated by the Directorate Generals for Sea Communication and for Oil and Gas. A National Contingency Plan will be developed; clean-up equipment has been purchased and deployed, and monitoring stations will be established along major oil tanker routes. The Committee on Marine Research coordinates monitoring and baseline research.

Malaysia's coastline is some 4,800 km long. Vulnerable ecosystems in addition to the marine ecosystem as a whole, include coral reefs, artificial reefs, mangroves and estuaries. (See Figures 4a, b, c.) Vulnerable resources within these ecosystems include marine fish and shellfish, marine parks, coastal aquaculture and mariculture areas, and endangered and/or protected species (eg, turtles).

The archipelagic *Philippines* has 18,000 km of coastline and its coastal zone plays a significant role in its economic development and ecologic stability (Figure 5). The Philippines has evolved a coastal zone management program to produce a master plan and formulate policy guidelines for optimum use of coastal zone resources. Valuable and vulnerable resources targeted for protection include mangroves, coral reefs, fishery spawning grounds, fish resources, coastal aquaculture sites and marine parks and reserves. Many of these resources are already under stress from sources other than ship-generated pollution. There have been several minor ship-generated spills in the Philippines in recent years, and rerouting of VLCCs from the Malacca Straits may result in an increase of such vessels in Philippine waters. A presentation of the state of coastal zone resources, including specific areas recommended for conservation/preservation, could serve as a guide to national and extranational planners designing routes and frequencies of vessels carrying energy materials within Philippine waters. Environmental protection regulations could affect entry and routing of vessels in waters under Philippine jurisdiction, and a regulatory scheme for marine transportation is being developed. Environmental protection, however, is only one fac-

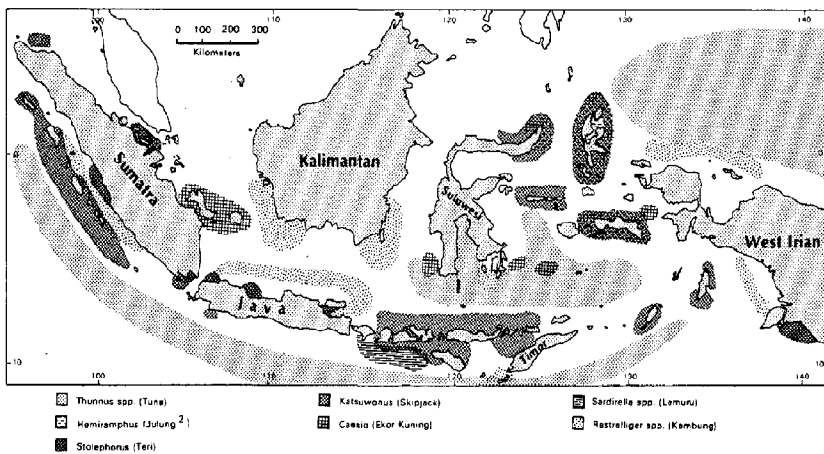
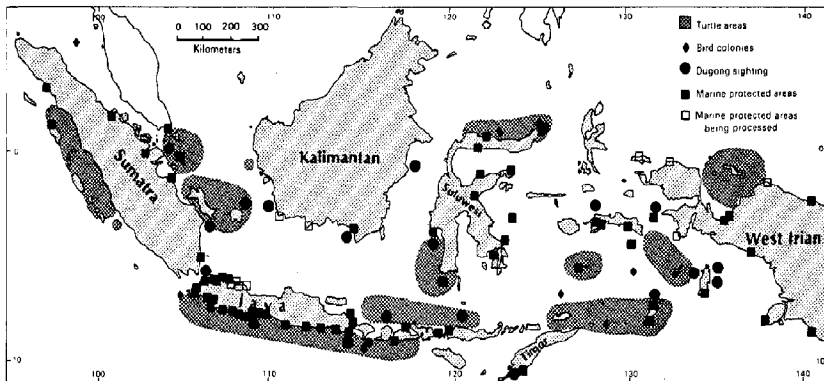
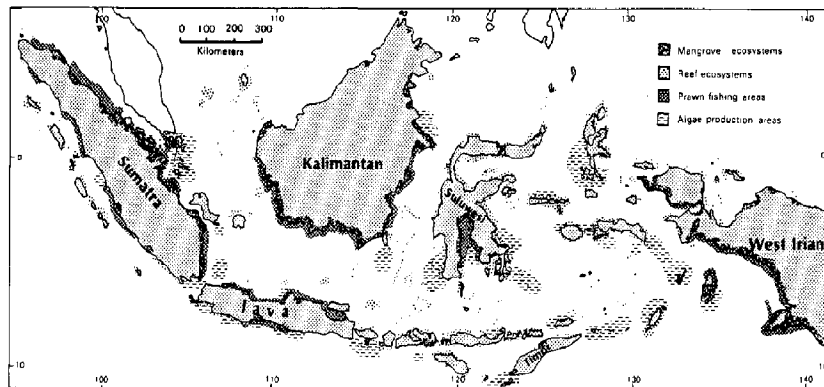


Figure 3. Indonesia: valuable and vulnerable marine environmental resources.

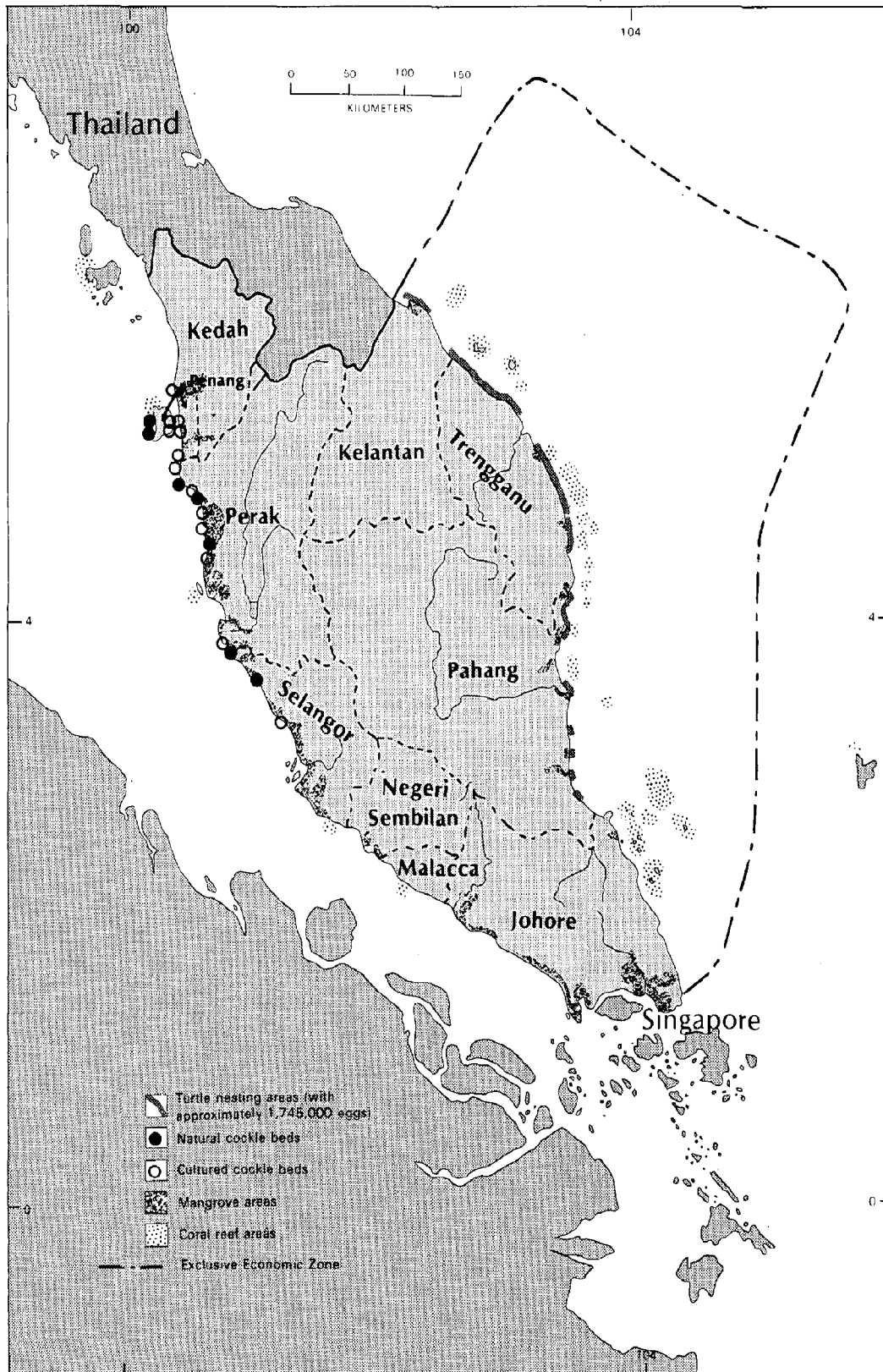


Figure 4a. Malaysia: valuable and vulnerable marine environmental resources.

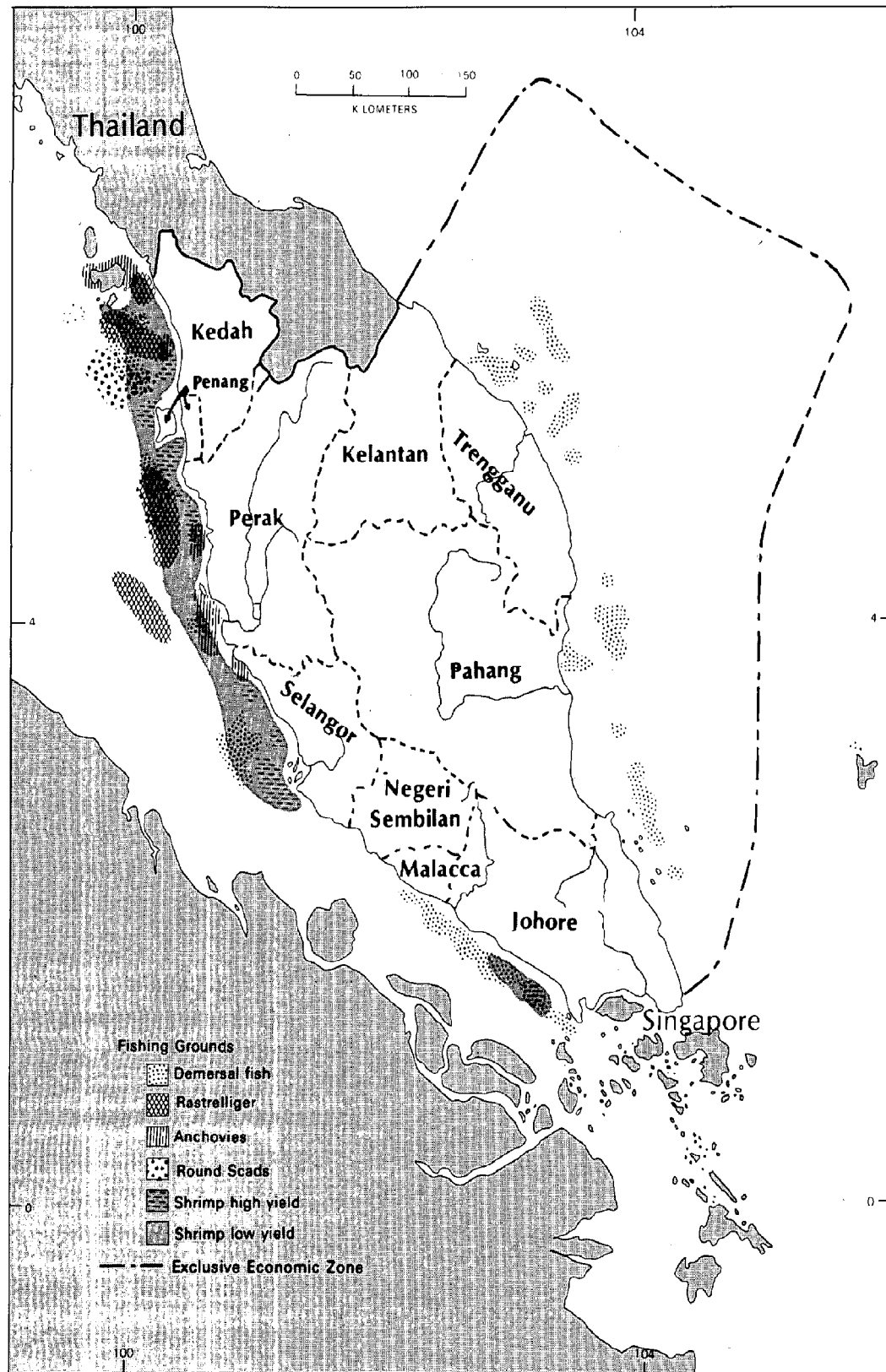


Figure 4b. Malaysia: valuable and vulnerable marine environmental resources.

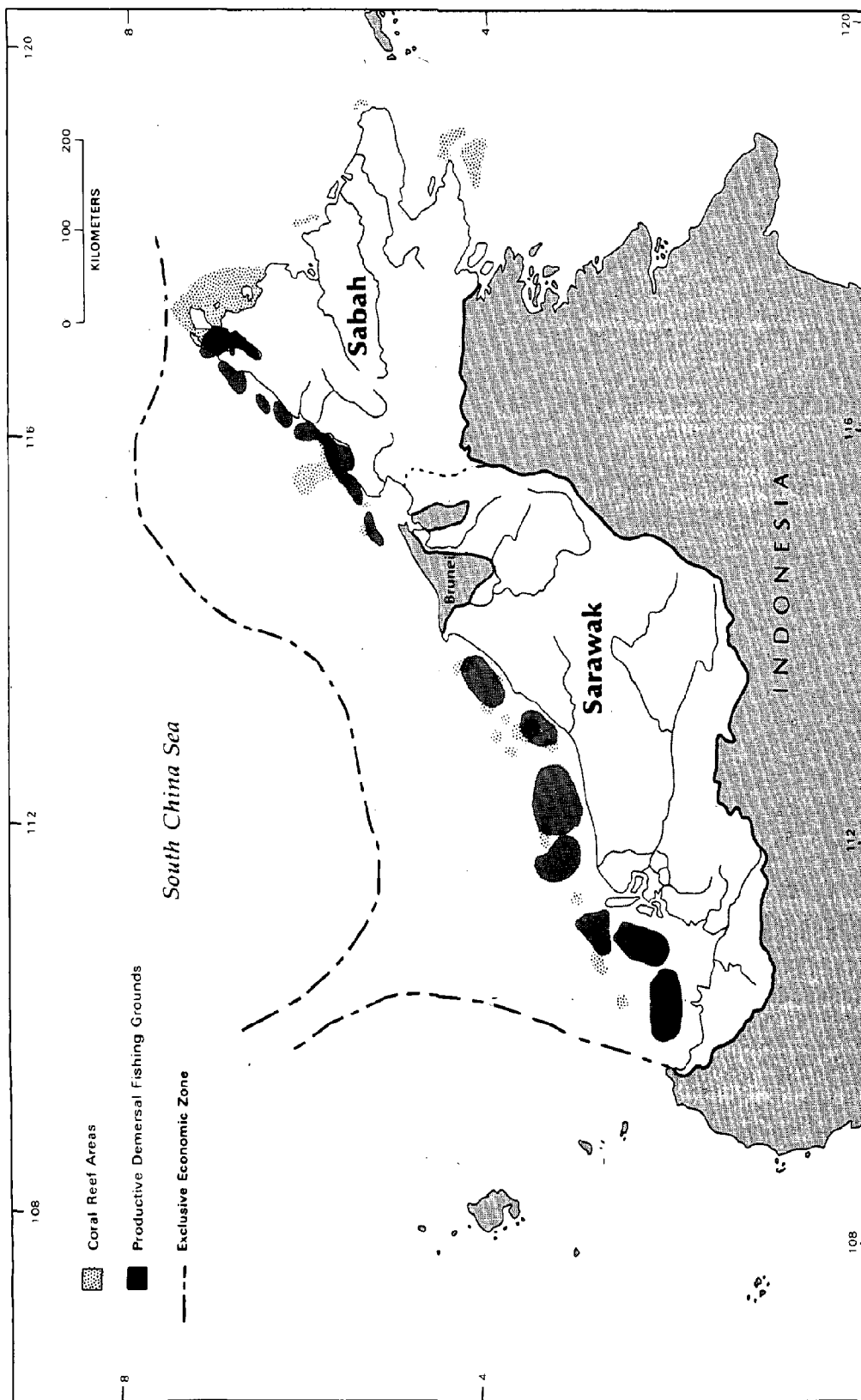


Figure 4c. Malaysia: valuable and vulnerable marine environmental resources.

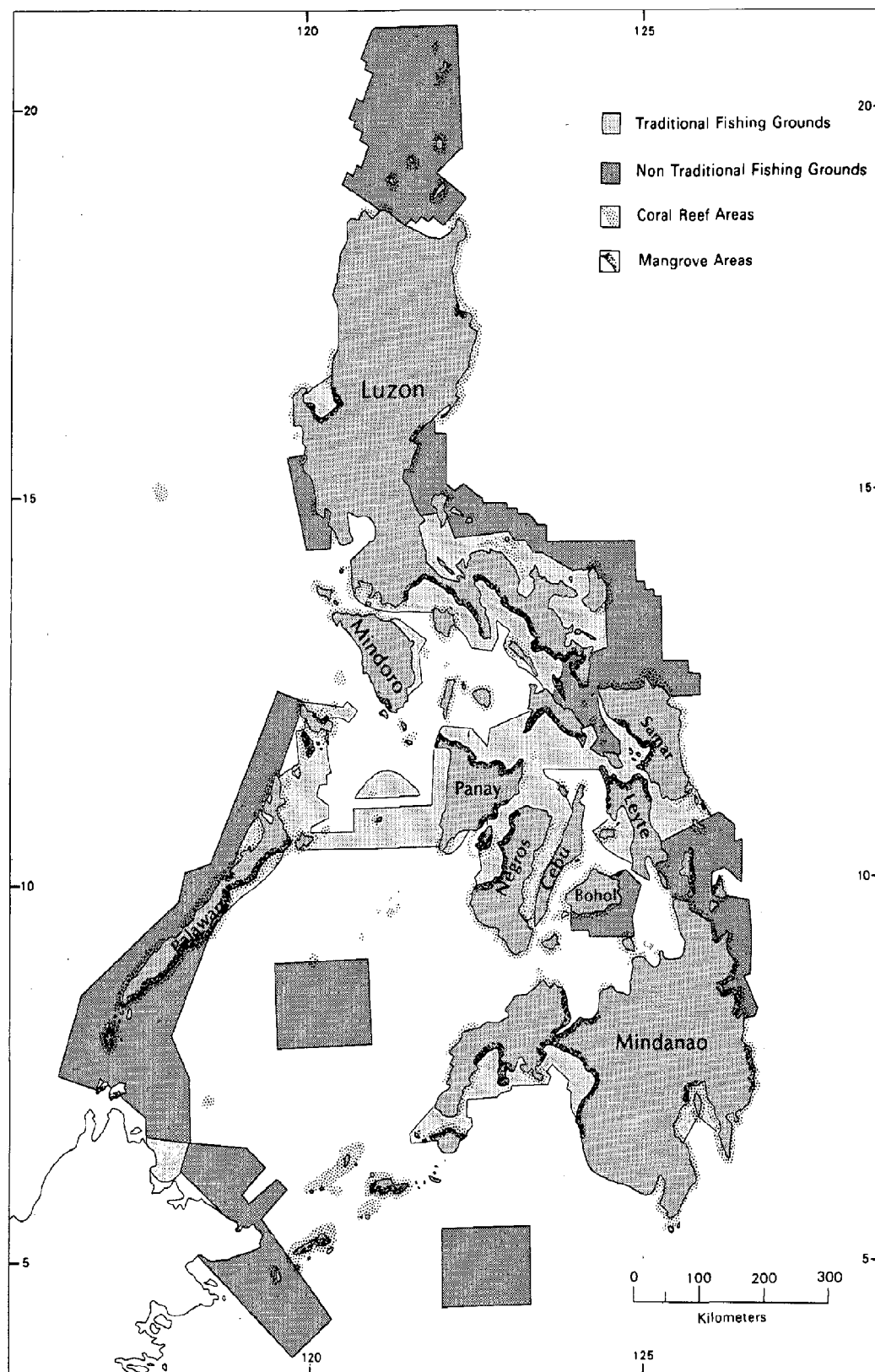


Figure 5. Philippines: valuable and vulnerable marine environmental resources.

tor and others that must be considered include the dependence of the Philippines on imported oil and, for through traffic, international relations.

Much information has been gathered on the valuable and vulnerable marine resources in these countries in recent years; the resource potential is high in relation to present use. The pressures on these resources are numerous, and ship-generated pollution is only one such source of impact. The effect of these pressures is gradual, not catastrophic, and causal relationships are difficult to demonstrate, making it harder to define any damages and obtain compensation from polluters. Thus, there is still a need for more baseline information even though strategies for environmental protection now exist and environmental assessment and impact statements are now being developed. In all these considerations, it must be remembered that people comprise the most important factor (indirectly) affected by environmental damage.

Within the ASEAN region, the transnational aspects of the marine environment and pollutants, the similarity of ecosystems, and the insufficient research, clean-up facilities, and expertise indicate a need for regional cooperation. Such cooperation on problems of common interest could reduce costs per member country and provide wider geographic, synoptic coverage and data for comparative analysis. Cooperative efforts have been initiated by the United Nations Environment Programme (UNEP) Regional Seas Programme, the ASEAN Committee on Petroleum (ASCOPE) (environmental aspects of oil exploration), and the ASEAN Expert Group on Marine Pollution (vessel-borne pollution).

International Legal and Political Developments

Freedom of the *high seas* includes freedom of navigation, overflight, fishing, scientific research, submarine cables and pipelines, and construction of artificial islands and other installations. There is no area left in Southeast Asia that is juridically under the regime of *high seas*. In its place exists a number of different regimes togeth-

er with a number of differing national views on these regimes, based partially on geography.

Internal waters are of two types—those inside straight baselines of normal coastal states, and those within closing baselines of archipelagic states. *Innocent passage* is that which is not prejudicial to peace, good order, and the security of the coastal state, and the regime can be suspended. There is no *innocent passage* regime for normal *internal waters* unless those waters have been delimited by new methods of drawing straight baselines; for *archipelagic waters*, the regime of *innocent passage* remains applicable. There are two types of *territorial sea*—those territorial waters not used for international navigation, in which the regime of *innocent passage* is applicable, and those waters used for international passage, where the *transit passage* regime is applicable. There are subtle but important differences between the regimes of *transit passage* in straits used for international navigation and *sealane passage* in *archipelagic waters* and the adjacent *territorial sea*, with the former offering a more liberal regime for the maritime powers. In the regime of *sealane passage*, the coastal state has the right to make rules and regulations including special requirements for nuclear and hazardous substances, and to delineate the sealane; passage must be continuous and expeditious. *Archipelagic sealane passage* differs from *transit passage* in straits because (1) *sealane passage* is a right which can be regulated and which has coastal state obligations attached, whereas *transit passage* in straits is a freedom with no restrictions and which cannot be suspended; (2) *transit passage* must be continuous and unimpeded whereas *sealane passage* must be continuous, expeditious and unobstructed; ie, the coastal state cannot place structures in sealanes; and (3) a sealane must be indicated on a chart, with an axis and a maximum width of 50 nmi, and it must be approved by the Intergovernmental Maritime Consultative Organization (IMCO); there are no such requirements for *transit passage*. In the *contiguous zone*, the regime of *freedom of navigation* applies except for certain rules and regulations pertaining to pollution, customs, immigration, and sanitation. In the *Exclusive Economic Zone (EEZ)* there is a *freedom of navigation* but the *EEZ* is not part of

the *high seas*. The coastal state retains the right to construct artificial islands, to undertake hot pursuit, and to implement environmental protection measures.

Although the Third United Nations Conference on the Law of the Sea (UNCLOS III) has formulated rules, they must be implemented by coastal states. Sealanes must be designated, safety schemes implemented, and navigational hazards publicized. What are the obligations of the coastal state in *internal waters* and how should they be determined? In which part of *internal waters* does the coastal state recognize *innocent passage* and in which part is it not recognized? Which straits can and cannot be used for international navigation? These and other potential problem areas may require cooperation between the users and the coastal state.

As regards the philosophy and concepts of marine environmental issues, the Third Committee of UNCLOS III has established the ethos for marine environmental management approaches. The tone of the text evolved by the Third Committee has been influenced by the philosophy of the Stockholm Conference. The provisions themselves emanate from treaty precedent but display an originality reflecting trade-offs between environmental responsibility and authority and a movement away from an analogy between treaty and legislation. The provisions represent a wide range of language from specific to general in an attempt to fill the gap between the need for uniformity and real world diversity. Intra- and interregional diversities must be accommodated in the implementation of this portion of the text.

United Nations Conference on Trade and Development (UNCTAD) decisions may have an effect on future shipping policy in the region. As background, China's fleet has changed from 25th largest to 14th since 1973, but the fact that much of this growth has been in used tonnage renders future growth difficult to predict. Taiwan tonnage grew substantially in 1980 and there is significant tonnage under flags of convenience. The Philippines fleet has grown steadily since 1975 with an increase of 30 percent in 1980. Hong Kong shipping strength (35th largest)

resides in open registry, much under the Liberian flag. The Indonesian fleet growth has been generally unspectacular but the ability to participate in energy cargos provides a solid base for expansion.

At present UNCTAD proposes cargo sharing in liner and bulk trades and a phasing out of open registry or "flag of convenience" shipping. Opinions differ as to the commercial advantage for developing countries of these proposals, because there may be other solutions to existing inequities. Under the present system, only the Philippine fleet has experienced a decline. Thus, UNCTAD initiatives to facilitate ship acquisitions through special finance packages and the marine technical assistance program may be useful for the Philippines but not for other countries in Southeast Asia. The Southeast Asian countries have demonstrated an ability to develop fleets under national flags, including in some cases the use of open registry. A phasing out of open registry may have negative impacts for Hong Kong and Singapore.

Obviously, implementation of the UNCTAD proposals would not affect the region's nations uniformly; however, national economic pragmatism and international politics are not always integrated. The growth of small indigenously owned, cross-trading fleets is linked to "market-place" criteria and has resulted in penetration of both the major and minor world liquid and dry bulk trades. Any plan denying free access to this business would attack the base that has enabled the significant growth of the Southeast Asian marine sector in the last decade.

On the other hand, the shipping industry is generally unregulated, because Intergovernmental Maritime Consultative Organization (IMCO) and UNCTAD recommendations are not binding. If international regulations are not forthcoming and/or acceptable to the region, a nation-by-nation patchwork system may develop. Environmental regulations developed by the region's newly emergent shipowners, however, might find more ready acceptance. On the other hand, the average age of tankers may increase, since there would be no commercial incentive to improve the fleet.

Regulatory Developments in Southeast Asia: Preventive and Remedial Approaches

Legislative approaches relevant to the problems associated with the marine transportation of energy materials include jurisdiction (claim-making and delimitation), impact control (marine pollution, vessel traffic control, and regulation of hazardous acts), and environmental management (fishery development and management, regulation of mining, coastal zone management, and preservation of the marine environment).

However, the emerging transnational aspects of marine pollution control are too complicated to be dealt with solely through national legislation and must be increasingly addressed by technical commitments that are both politically acceptable and bureaucratically manageable. These commitments take the form of constitutive treaties such as the draft Caracas Convention, other problem-specific global treaties, regional arrangements, or policy declarations.

Although Southeast Asia has witnessed in recent years a significant growth of national legislation pertaining to environmental protection, there is little national legislation dealing directly with the regulation of foreign vessels carrying energy materials through the South China Sea. Yet, the entire sea has been brought under the national jurisdiction of the coastal states and these coastal states have, under the draft Caracas Convention, the right to enforce (1) "generally accepted" international rules; (2) "applicable" international rules; and (3) the coastal state's own marine environmental protection legislation concerning traffic control and discharge standards. Traffic control measures include traffic separation schemes, the designation of sealanes, and vessel traffic management. Discharge standards more stringent than international standards can only be promulgated if justified by special circumstances of oceanographic or ecologic conditions, utilization and protection of resources, and the character of marine traffic in the coastal state's waters, and after consultation with IMCO.

Despite its flaws, not least of all from an envi-

ronmental perspective, the draft Caracas Convention should be signed and ratified by the States of the region. Similarly, all governments are urged to ratify MARPOL 1973 and its 1978 Protocol, as well as several important global treaties dealing with ship-generated marine pollution (eg, 1954 OILPOL and its 1962, 1969 and 1971 Amendments; 1969 Civil Liability Convention and its 1976 Protocol; 1971 Fund Convention and its 1976 Protocol; and the 1972 London Dumping Convention and its 1978 Amendments); and other global treaties concerned with other aspects of the marine environment (eg, CL for Explore and Exploit 1977; COLREGS 1972; and STWC 1978). (These treaties are described briefly in Table 1.)

At the regional level, it is hoped that the South China Sea countries will adopt the Action Plan for the East Asian Seas promoted by UNEP and that they will use this framework as an innovative approach to regional cooperation for the purpose of regulating the transportation of energy materials through their shared marine environment.

At the national level, there is a considerable variety of measures that can and should be adopted by the five coastal states, including:

1. the further designation of sealane passage routes in the region in accordance with the draft Caracas Convention;
2. the maintenance and further development of traffic separation schemes in the region in accordance with the draft Caracas Convention;
3. the development of vessel traffic management systems in a manner that is not inconsistent with the draft Caracas Convention;
4. the development of contingency plans for oil spills of all types and magnitudes, along with the creation of institutions that could coordinate national responses with regional responses;
5. the creation of institutions to carry out the duties placed on port states and coastal states by the draft Caracas Convention;
6. the development of mechanisms to encourage the research necessary for the designation of special environmental areas, in accordance with the principles of the draft Caracas Convention; and

7. the prohibition of especially hazardous cargoes from vulnerable areas in accordance with international law.

Hypothetical case studies of compensation for ship-generated marine pollution can help focus attention on key issues. Although economics have forced the reduction of deliberate vessel-source pollution, accidental spills involving vessels carrying pollutants have not decreased; 80 to 90 percent of these incidents are due to human error and can be avoided. It is accepted practice in all legal systems that if damage cannot be avoided in the first place, then whatever has been damaged must be restored to its undamaged condition, and losses arising from the damage must be compensated. If the damage cannot be fully expunged, then there must be effective compensation.

The main problems relate to who is liable for damage and how high the compensation should be. Insurers have been reluctant to underwrite strict liability for ship-generated marine pollution. Not only must damage be proven with detailed quantification, but, under certain circumstances, insurers will only pay up to a specified ceiling, thus allowing the shipowner to limit liability. Recognizing the inadequacy of insurance coverage for ship-generated oil spills, the insurance, shipping, and oil industries have attempted to create additional coverage for major pollution damage. There are generally no winners in major pollution incidents. Environmental scientists must be able to put a price on the environment, including its long-term value, because this is the only language underwriters understand. To put such a value on the environment, scientists should make studies of projected movements of possible spilled oil, and environmental baseline surveys should be undertaken to provide comparative data before a spill occurs.

It would be to the advantage of coastal states to ratify or accede to the various international Conventions so as to be able to claim compensation

under their various provisions. Compensation systems are not sufficient, however, to cover damage in most catastrophic incidents; also, they apply only to oil. As coastal state facilities increase, liability for accidents may shift more to the coastal state, but who should pay for the maintenance of safe navigation schemes—the users (including, sometimes, the coastal state), or the coastal state that wants to protect its environment?

The North Sea Voluntary Compensation Scheme (OPOL) is a particular example of an industry compensation scheme. OPOL is a voluntary mechanism established by operating companies at government prompting. Under OPOL, pollution claims by public authorities and/or the public can be speedily settled, within set financial limits without either disputes or the need for protracted legal proceedings.

OPOL features include strict liability except for "acts of God," act of a third party or negligence of the state or claimant, restriction of parties to operating companies, coverage for offshore facilities, limits of liability of US\$25 million per incident and US\$50 million in annual aggregate, and a requirement of evidence of financial responsibility of member operators.

OPOL's stated aims are to:

1. provide an orderly means for the expeditious settlement of claims arising out of an escape or discharge of oil from offshore exploration and production operations;
2. encourage immediate remedial action by participants;
3. ensure the financial responsibility of participants to meet their obligations;
4. guarantee that claims will be met; and
5. avoid complicated jurisdictional problems.

The agreement has succeeded in its stated aim and as such should be considered, with appropriate modification, for application in Southeast Asia.

CONCLUSIONS

The Impact of Changing Vessel Design

The world of shipping is expected to experience significant technological changes in the 1980s and thus to become more complex. For example, more Crude Oil Washing (COW) and inert gas systems designed to reduce ship-generated marine pollution will be fitted to tankers in the 1980s. Mariners will have to rely more heavily on instrumentation and be more highly trained. Some new equipment may prove to be dangerous, if it is not properly used.

With the encouragement of UNCTAD, a number of developing states will begin to build their own merchant fleets, and thus a greater number of states will become involved in shipping. Consequently, it will become more difficult to attain and maintain uniformly high standards for the training of seamen. Regional training centers should be established for seamen from new, emerging shipping states. The present international standards for the training of seamen, as expressed in IMCO's STWC 1978 represent only the least common denominator; the standards must be improved. The shipping industry itself has been slow to respond to the need for an increase in the training standards of mariners. Thus, the shipping community must not only increase the level of training of seamen but change the old patterns of training developed in northern and western Europe. It is hoped that a new level of professionalism will emerge among mariners in the 1980s so that the human error factor responsible for causing 80 to 90 percent of ship-generated marine pollution incidents will be reduced.

Environmental Policy Development

No coordinated environmental policy exists for the seas in the region. Indeed, the fact that there is no longer an area of *high seas* regime in the South China Sea presents a challenge to the coastal states to develop regional environmental

cooperation, as specifically called for in the draft Caracas Convention. The UNEP Regional Seas Programme Action Plan has already encountered difficulties due to conflicting offshore claims and nonparticipation of some major claimants. So far, the coastal states of the South China Sea have emphasized a strengthening of their national legislation instead of seeking regional solutions to reduce ship-generated marine pollution. Thus an initial patchwork of environmental policy initiatives seems likely, possibly leading to double standards for indigenous versus through carriers, variation in navigational aids, contingency plans for disaster situations, and disparities in environmental management experience.

Existing coastal zone management planning is based on interagency links rather than on any comprehensive overview of pollution and multiple resource uses, and as a result management is fragmentary both at the national and at the regional level. In certain areas, particularly along the international straits, coastal zone management faces the additional challenge of heavy marine traffic almost oblivious to damage caused in the coastal zone from pollutants released during routine operations. The possibility of establishing pristine environmental baselines in these areas is greatly diminished or precluded because hydrocarbon exploration and development and other exploitive uses of the coastal zone have been underway for years in some areas.

Yet there is a need for an inventory of present environmental conditions as input to the development of marine and coastal zone environmental policy. At minimum, good resource inventories should be available as the basis for developing coastal management plans and for determining what effects marine pollution incidents are likely to have on an area. The results of a few such studies are available for selected areas such as the Bight of Bangkok, West Sabah, the East Coast of Peninsular Malaysia, and the Malacca Straits. These baseline studies, and associated analyses of marine pollution incidents, have in-

volved a degree of regional cooperation, in addition to within-country studies. The lessons learned, even in such basic areas as the preparation of navigation maps, should be applied where needed elsewhere.

Areas requiring special study include major straits such as Lombok and Makassar, Sunda, Ombai-Wetar, San Bernadino, Verde Island Passage, and Surigao, the waters north of Sabah, and the Gulf of Thailand. Ultimately, much of the information derived from such resource inventory work should be summarized in a marine atlas format. Characterizations such as high or low environmental risk, sensitivity, or value could be applied to geographic areas and thus provide a more comprehensive base for environmental policy formulation.

Compensation for Marine Environmental Disasters

Compensation to states for pollution spills is a complex subject. Environmental baseline studies are necessary, because without such preliminary studies it is difficult later to determine and prove extent and cause of the damage. Beyond determining the extent of the damage is the equally difficult task of placing a monetary figure on the damage. Long-term ecosystem effects are particularly difficult to quantify in economic terms. Scientists would have difficulty estimating costs not directly related to exploited resources such as fish, but that is precisely what is needed from the scientific community. Moreover, the problem of conflicting scientific testimony in the realm of multiple sources and uncertainty, and problems with the admissibility of evidence also present obstacles to juridically determining the fair costs of pollution incidents.

Marine insurance rate determination often does not reflect the likelihood of a ship causing a spill. The shipping industry's compensation funds for marine pollution, ie, the Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP) and the Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution (CRISTAL),

also fall short of providing sufficient compensation for all marine environmental disasters. There is merit in a "user-pay system" in which the users of a waterway would pay for any environmental damage to it. A precedent may already exist in Japan's US\$2 million pollution fund for the Straits of Malacca, but there are numerous other users of the Straits besides the major user, Japan, who have not contributed to the Fund. Cooperation between maritime user states and coastal states has been sorely lacking.

One of the major difficulties in obtaining compensation is that the burden of proof rests on plaintiffs in such situations. Perhaps the fault issue should be resolved by no-fault schemes. No-fault schemes might reduce the amount of conflicting evidence regarding the extent and value of the damage caused by a pollution incident.

But who should support such a fund? The tanker industry is already working on a slender profit margin and is thus an unlikely candidate to support compensation funds. The oil exporters and the oil importers are potential supporters. The oil industry, in the past, however, has expressed an unwillingness to go beyond the TOVALOP and CRISTAL schemes and is thus unlikely to support new funds. Perhaps the best method would be to levy the cost against the cargo itself. This system, unfortunately, would only work well for those states that import significant quantities of oil. Such a scheme would be of little use to a state whose coastal waters are used by through tanker traffic, and in the South China Sea region there is a considerable amount of such through traffic.

The Roles of Oil and Shipping Industries in Marine Pollution

The shipping industry is generally poorly understood by the public. The industry is both highly competitive and very cost conscious. In this situation some operators may cut corners to achieve higher profit. For example, environmental considerations may be ignored when it is more costly to operate a vessel that is following

safe environmental practices. In some situations it is conceivable that risk analysis may be undertaken as a basis for decisions relating to environmental protection and vessel operation. It is hoped that in future conferences, more representatives from the shipping industry would participate so that they could inform others of the constraints under which they are operating.

Just as an environmental data base is lacking for the South China Sea, so too is there an insufficient data base on the shipping industry as a whole, and specifically on the condition of tankers in use. The classification societies, salvors, and marine underwriters probably have the most information on the condition of vessels but this information is not readily available. Recently, Lloyd's of London has started a computer bank for the storage of information on all ship problems. This information has been coded on a geographic world grid so that the location of the problem can easily be retrieved. Also, in the United States there is an information service that provides data on a ship's history. If coastal states use these services or develop similar information systems, then they would be able to know what to expect in the event of a ship encountering problems in their waters. Such a system would be a significant aid to pollution contingency planners in coastal states. Furthermore, such information would be a valuable addition to marine atlas work now underway to delineate high risk areas.

It may be useful to educate the shipping industry on the environmental impacts of its actions. Mariners have usually been taught only ship safety and safe navigation; now they should also be taught to be environmentally conscious. The oil companies might play a leading role in persuading the shipping industry to raise its environmental awareness. A proper forum for raising these concerns may well be the International Association of Independent Tanker Owners (INTERTANKO), an association of tanker owners that often represents their interests.

The Effect of the Law of the Sea on Marine Pollution

The major impact of the new Law of the Sea on marine pollution may be manifested through the new powers given to coastal states to set standards for ship-generated marine pollution. Moreover, the proliferation of legal regimes in the offshore will require a new awareness on the part of mariners. The vessel traffic management schemes that coastal states might be adopting under the new Law of the Sea could well have an impact on the international vessel collision regulations. The designation of sealanes, traffic separation schemes, vessel traffic management systems, and areas of special environmental significance by coastal states will require cooperation with international organizations like IMCO, neighboring coastal states, and user states. Such systems should be integrated with the coastal states' coastal zone management plans and pollution contingency, planning including their placement of pollution cleanup and salvage equipment.

Along with the designation of areas of special environmental concern, coastal states may have to designate areas where stricken tankers or other disabled vessels may be taken, and the route along which they may pass. Such tanker "hospitals," although not specifically provided for in the new Law of the Sea, would seem to fall under a state's general obligation to provide for oil pollution contingency planning in the waters under its jurisdiction. Such "hospital" or "safe" areas might well be set up under regional cooperation schemes, such as the ones the Law of the Sea envisages for semienclosed seas like the South China Sea. While coastal states have gained additional rights in the offshore, the new Law of the Sea also confers additional obligations such as the protection of the marine environment; this obligation in turn requires an enhanced knowledge of the marine environment.

APPENDIX 1

Description of the EAPI Project on Marine Environment and Extended Maritime Jurisdictions: Transnational Environment and Resource Management in Southeast Asian Seas

Many countries are extending their national jurisdictions to 200 nautical miles from their shores. Yet many of the resources of the ocean are transnational in distribution, and the ocean, as a continuous fluid system, transmits environmental pollutants from one jurisdiction to another. Also, maritime activities such as transportation have relied on free access to areas now falling within national jurisdictions. As nations develop policies for managing their new jurisdictional areas, they need a sufficient scientific and technical understanding of the transnational character of the ocean environment. Without this knowledge, such policies may increase international tensions and misunderstandings and lead to conflicts concerning management of marine activities, resources, and environmental quality. This Project focuses on issues that will arise in Southeast Asian seas during the decade of the 1980s.

Central Research Questions

1. **What is to be managed?** Resources and resource-related activities, or use patterns, are to be managed. Important resource activities include oil and gas exploration and exploitation, fishing, transportation and navigation, and scientific research.
2. **How are these resources and resource-related activities to be managed?** The types of jurisdictional regimes and their specific content will determine how these are to be managed.
3. **Who will manage these resources and resource-related activities in these jurisdic-**

tional areas, and who will be affected? This will be determined by extended jurisdiction, boundary delimitation, and resolution of boundary disputes.

Major Research Areas

Research is being conducted in four substantive areas: transnational efforts on transboundary fish stocks, regional marine environmental management issues, energy material transportation and environmental policies, and transnational oil and gas resource management issues. Each of these areas is examined with respect to three fundamental components of transnational ocean management issues: the natural environment, political-socioeconomic factors, and juridical regimes. Results of much of this research will be synthesized in a marine policy atlas and a sourcebook for policy formulation.

Transnational Efforts on Transboundary Stocks

Access of distant-water fishing fleets to stocks within many of the extended jurisdictional zones is undergoing an abrupt or phased reduction, or an alteration of operational terms. As a result, distant-water fishing efforts are being concentrated in jurisdictional zones of nations permitting favorable concessionary access. These changes have significant implications for sustainable fishing practices and for international relations as fish migrate among national zones.

At EAPI, researchers are comparing the ad-

vantages and disadvantages—for the resource owner, resource exploiter, and the resource—of various cooperative arrangements for distant-water fishing for tuna. This substantive area has received the focused effort of a multidisciplinary, multinational team of researchers from Indonesia, the Philippines, Japan, and the United States.

Although the efforts in this area are nearly complete for project purposes, there is a possibility that related activities may be organized in the future. Several journal papers and monographs are being prepared for publication as a result of the work in this area.

Regional Marine Environment Management Issues

Many aspects of environmental management will always remain the responsibility of nation states, while others may best be approached on a coordinated regional basis. Scientific, legal, and policy approaches to regional environmental protection have been or are being formulated or contemplated by the states bordering semienclosed seas such as the Baltic, the North Sea, the Mediterranean, the Caribbean, and the Iranian-Saudi Arabian Gulf. In this research area, these approaches will be compared to the natural and political circumstances pertaining in the South China Sea region, with a view to delineating possible useful precedents. As part of this work, EAPI co-sponsored with several United Nations and regional organizations a Workshop on Coastal Area Development and Management in Southeast Asia in late 1979. It is anticipated that three monographs will be prepared reporting on research in this area.

Energy Material Transportation and Environmental Policies in Extended Jurisdictional Zones

Environmental policies in extended jurisdictional zones may influence transportation routes of energy sources or byproducts such as oil, uranium, nuclear spent fuel, and eventually, hydrogen. Altered routing of energy materials

may have an impact on energy policies themselves. Also, energy needs and policies will determine energy material transport needs and policies and thus influence environmental policies regarding transport of energy material in extended jurisdictional zones. There is thus the prospect of a dynamic interaction between national energy policies and environmental policies in extended jurisdictional zones, with transportation requirements, routes, and standards of transport as the link.

The Workshop reported herein is an outgrowth of this area of work. In addition to the Proceedings of the Workshop, a monograph on the subject will be completed in 1981.

Transnational Oil and Gas Resource Management Issues

Management regimes for oil and gas exploration and exploitation in disputed areas, transboundary deposits and research, and transboundary environmental quality in relation to oil spills emanating from oil exploration are important components of transnational ocean policy issues.

The objectives of this research area are to identify and characterize transnational issues involving offshore hydrocarbons and to analyze the transnational implications of alternative approaches to their resolution. For example, it is possible that cooperative joint ventures could be established by the disputants with multinational companies for the development of hydrocarbon resources in the disputed areas by drawing on precedents of agreements such as those between the Republic of Korea and Japan and between Thailand and Malaysia. Disputes involving accumulations divided by extended national resource ownership could possibly be dealt with in similar fashion.

A major workshop on the subject, co-sponsored with the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP), was held in mid-1980 with participants from ten countries and five multinational oil companies. The proceedings will be published.

*A Synthesizing Product:
The Marine Policy Atlas*

In addition to specific results of research in the four areas, which will be published as they develop, a major objective of this Project for the next two years is the preparation of an atlas of marine policy parameters and issues in Southeast Asian seas. Its purpose will be to set forth research findings from the Project in graphic and cartographic formats that may be useful as background material in cooperative, common, and national policy decisions.

The atlas is intended to be more than a mere storehouse for information; it will also be an

analytical and heuristic device for broadening understanding of national attitudes and behavior toward the oceans in a regional setting to assist in policy making.

Included in the atlas will be displays of several topics: the natural environment and its use by humans, national indices directly relevant to patterns of marine use, patterns of use and their trends, present and projected marine jurisdictional boundaries and content, and projections and scenarios of international marine policy issues. A sourcebook for policy formulation will also be prepared, drawing heavily on the work of individual project members.

APPENDIX 2

Description of the Dalhousie Ocean Studies Programme

The Dalhousie Ocean Studies Programme (DOSP) was established at Dalhousie University in Halifax, Nova Scotia, in July 1979 through a grant from the Social Sciences and Humanities Research Council of Canada. The program was conceived of as a multidisciplinary research and training program investigating "new directions in ocean law, policy and management."

The first of its three main objectives is research into the specific areas of ocean law and policy,

ocean transportation and offshore business, marine resource management, and coastal community development. Second, DOSP aims at providing degree and nondegree training opportunities in both the practical and theoretical skills required for research and the training of future ocean specialists. On working toward these two goals, DOSP is reaching its third objective, that of establishing a Canadian center of excellence in ocean law, policy, and management.

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